North East Trees

Arroyo Seco Watershed Management & Restoration Plan

SWRCB Nonpoint Source Conference

November 8, 2005

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Project Disclosure

Funding for this project has been provided in full or in part through a contract with the State Water Resources Control Board (SWRCB) pursuant to the Costa-Machado Water Act of 2000 (Proposition 13) and any amendments thereto for the implementation of California's Nonpoint Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Arroyo Seco Is A Diverse Watershed Connecting the San Gabriel Mountains to the Los Angeles River

- Runs **22 linear miles** from its beginnings in the San Gabriel Mountains to its confluence w/ the Los Angeles River
- Over those 22 miles, the Arroyo Seco **drops from an elevation of over 6,100 feet at Strawberry Peak to 320 feet** at the Confluence
- **Land area of approximately 47 square miles,** of which 32 are contained in the mountainous terrain above the Devil's Gate Dam (6% of LA River watershed).
- **Sections of four cities** - La Canada – Flintridge, Pasadena, South Pasadena, and Los Angeles (plus unincorporated Altadena) - **lie within the watershed**
- **Highly urbanized, but with many natural pockets remaining**

Project Goals and Objectives

Goals

Improve water quality for beneficial uses, including protecting public health

- **Do so in a manner that is consistent with watershed restoration**

Restore habitat for terrestrial and aquatic species

Objectives

To create a watershed plan with technically sound, environmentally sustainable project recommendations

To present project information in a way that allows other organizations and agencies to

- **identify high-priority projects in the watershed, and**
- **quickly develop project plans and funding proposals for high-priority projects**

Project Background

Started in October 2003, with a target completion date of March 2006

Funded under a Proposition 13 grant, administered by the State Water Resources Control Board

Scope of work focuses on three streams

- **Water Quality Technical Study**
- **Habitat Restoration Technical Study**
- **Outreach**

Although titled a Watershed Management and Restoration Plan, this project does *not* cover some elements typically included in a watershed plan

- **Water supply**
- **Fluvial geomorphology**
- **Open space analysis**

Water Quality Context for the Arroyo Seco Watershed

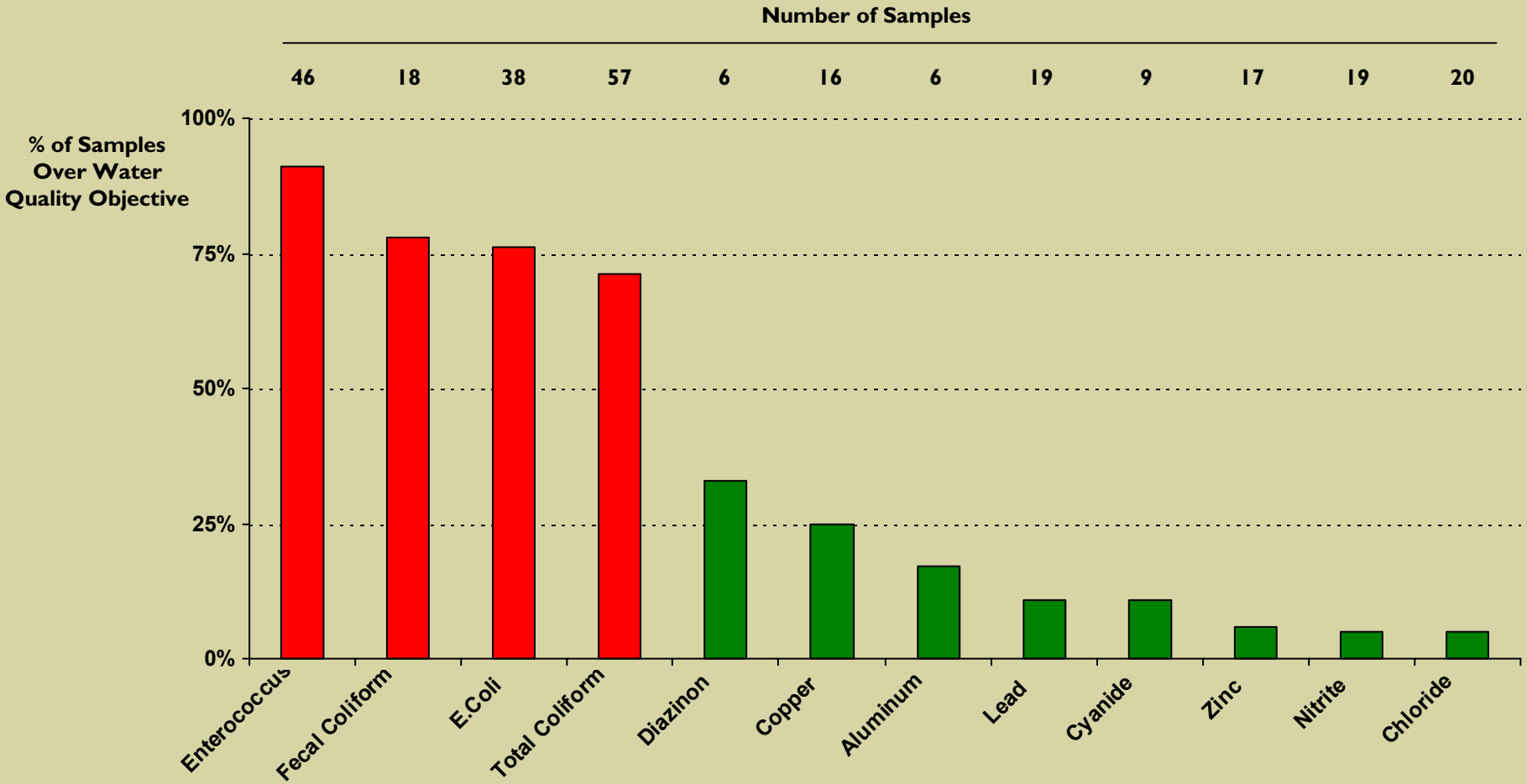
Arroyo Seco on the 303(d) list for

- **High coliform**
- **Trash**
- **Algae**

Also covered under LA River Metals TMDL as a tributary to the LA River

- **Dry weather – Cu, Pb**
- **Wet weather – Cu, Pb, Cd, Zn**

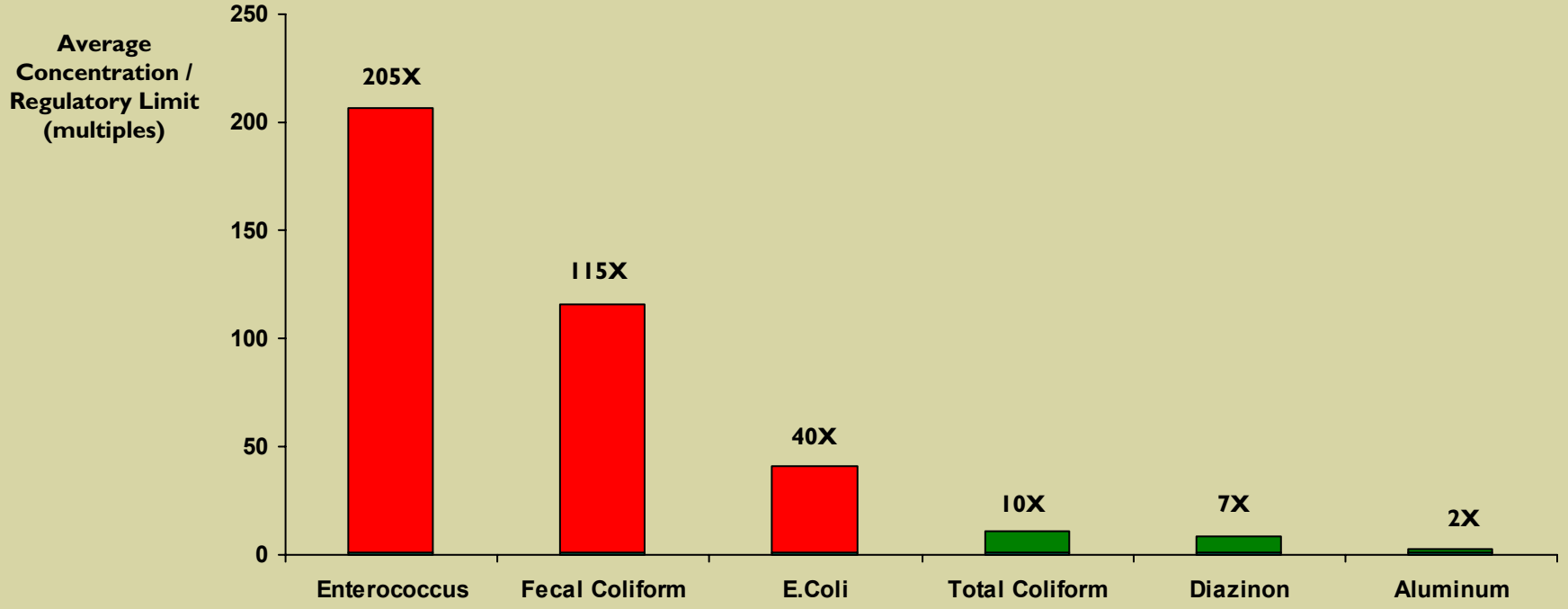
Eleven Different Pollutants Exceeded Water Quality Objectives at Least Once



Note:
-Regulatory limits were not available for all constituents showing elevated concentrations

… and Average Concentrations of Six Contaminants Exceeded Water Quality Objectives

Graph of Average Concentration as a Multiple of Water Quality Objective



Regulatory Limit	Basin Plan	Basin Plan	Basin Plan	Basin Plan	CA DF&G	Basin Plan
Value	104	400	235	10,000	0.08	1.0
Units	MPN / 100mL	MPN / 100mL	MPN / 100mL	MPN / 100mL	ug / L	mg / L
# of Samples	46	18	38	57	6	6

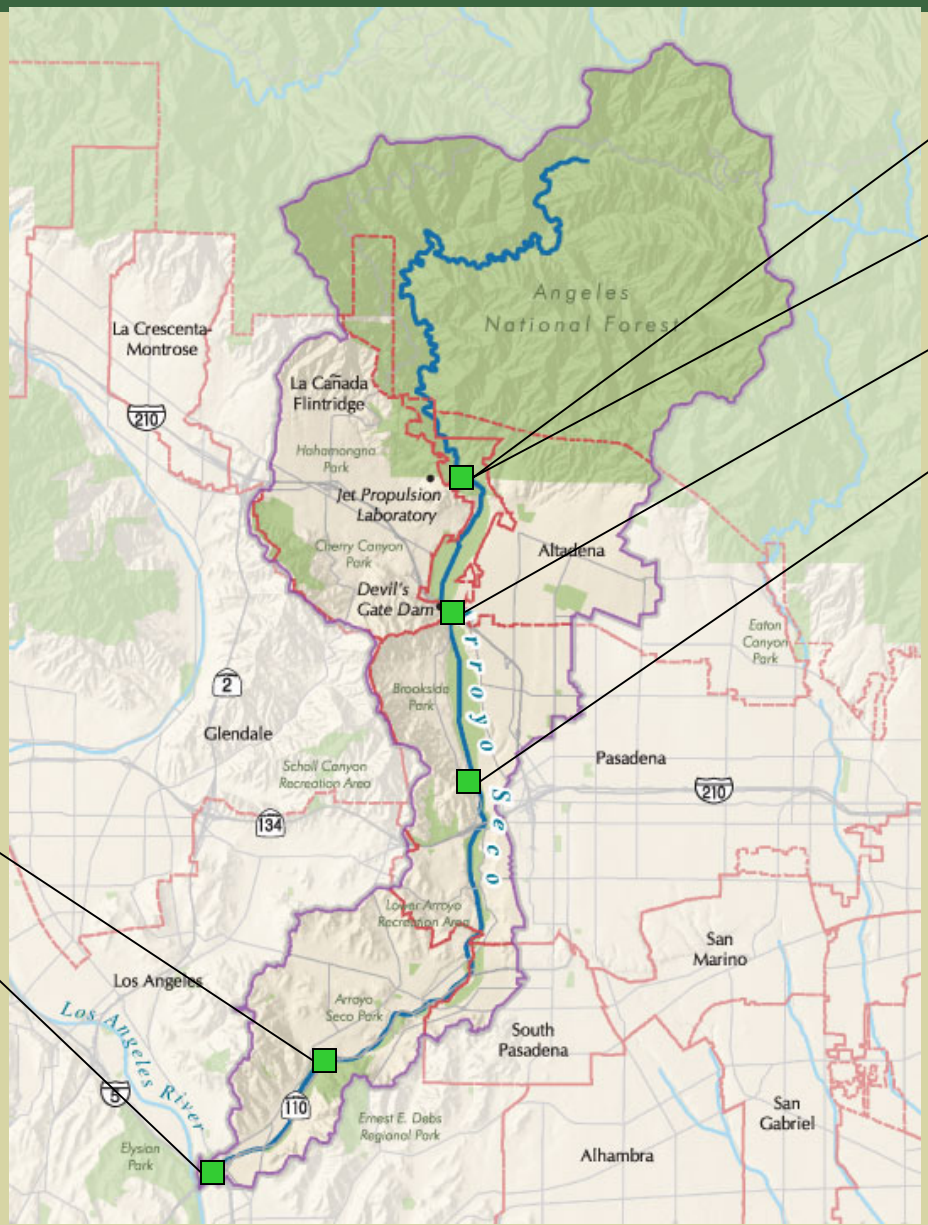
Note: Limits that varied based on water chemistry parameters were not included in this analysis

Summary of Water Quality Data Comparisons

Parameter	# Samples	Average Concentration	Water Quality Objective	Source	# Samples Over WQ Objective	% of Samples Over WQ Objective
Enterococcus	46	21,500	104	Basin Plan	42	91
Fecal Coliform	18	46,100	400	Basin Plan	14	78
E.coli	38	9,600	235	Basin Plan	29	76
Total Coliform	57	102,400	10,000	Basin Plan	40	70
Diazinon	6	0.00059	0.00008	CA DF&G	2	33
Copper – Total	16	0.0178	0.022 (D) 0.017 (W)	LAR TMDL	4	25
Aluminum	6	1.75	1	Basin Plan	1	17
Lead	19	0.0103	0.011 (D) 0.062 (W)	LAR TMDL	2	11
Cyanide	9	0.004	0.0052	CTR	1	11
Zinc – Total	17	0.0783	0.16 (W)	LAR TMDL	1	6
Nitrite	19	0.209	1	Basin Plan	1	5
Chloride	20	88.7	150	Basin Plan	1	5

However, Limited Spatial Distribution of Data Makes Identification of Source Areas Difficult

Southern sampling locations	
Contaminant	# Samples
Aluminum	6
Chloride	15
Coliform – Fecal	16
Coliform – Total	43
Copper	14
Diazinon	6
E.coli	26
Fecal Enterococcus	34
Lead	14
Nitrite	17
Zinc	14



Upper Hahamongna
Pasadena

JPL
Pasadena

Devil's Gate Dam
Pasadena

Seco St. Bridge
Pasadena

Debs Park
Los Angeles

Confluence
Los Angeles

Northern sampling locations	
Contaminant	# Samples
Aluminum	0
Chloride	5
Coliform – Fecal	2
Coliform – Total	2
Copper	2
Diazinon	0
E.coli	0
Fecal Enterococcus	0
Lead	5
Nitrite	2
Zinc	3

Summary of Water Quality Results

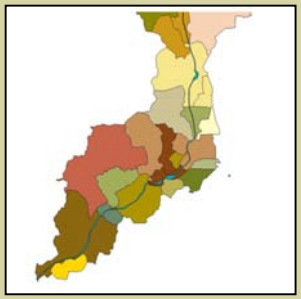
Bacteria far and away the most significant water quality impairment

Exceedences also evident for copper, lead, and zinc as compared to recently released LA River TMDL

Data not sufficient to identify key nonpoint source areas

Modeling Based on PLOAD Nonpoint Source Model Used to Compensate For Data Limitations

Land use information



Sub-watershed descriptions

Permeability Estimates By Land Use

LU_Group	Percent_Imperv	Description
1	60	Mixed Residential
2	60	HDSFR
3	80	Multi-Family Residential
4	95	Retail / Commercial
5	95	Transportation
6	82	Education
7	1	Vacant
8	80	Light Industrial
9	42	LDSFR

Note: Based (roughly) on LA County stormwater values

Permeability data

Event Mean Concentrations by Contaminant

LU_Group	LU_CAT	ColiformF	ColiformT	Copper - Total	Enterococcus	Lead - Total	Nitrite (as Nitrogen)	Zinc - Total
HDSFR	2	1,085.35	1,395.69	0.0153	904.56	0.0096	0.090	0.080
Light Industrial	8	653.07	508.71	0.0314	128.81	0.0149	0.090	0.566
Vacant	7	2.18	21.29	0.0091	1.04	-	0.050	0.039
Retail / Commercial	4	1,071.66	1,733.01	0.0348	105.09	0.0115	0.140	0.239
Multi-Family Residential	3	1,085.35	1,395.69	0.0122	904.56	0.0051	0.080	0.135
Transportation	5	1,340.17	806.94	0.0519	34.66	0.0091	0.090	0.279
Education	6	1,071.66	1,733.01	0.0215	105.09	0.0045	0.080	0.124
Mixed Residential	1	1,085.35	1,395.69	0.0173	904.56	0.0087	0.100	0.185
LDSFR	9	1,085.35	1,395.69	0.0153	904.56	0.0096	0.090	0.080
Units		1,000 MPN / 100mL	1,000 MPN / 100mL	mg/L	1,000 MPN / 100mL	mg/L	mg/L	mg/L

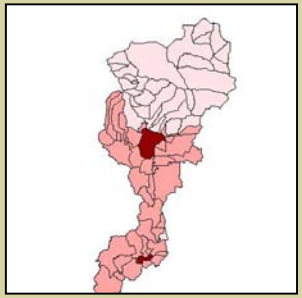
Note: Gray shading w/ bold text indicates data not present; value assumed based on similar land use category
Source: Los Angeles County DPW

EMC data

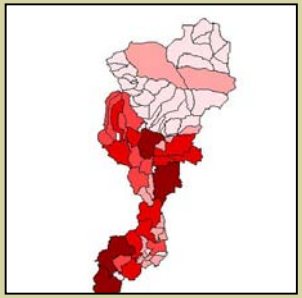
Annual Rainfall Estimate
20 inches

Rainfall Data

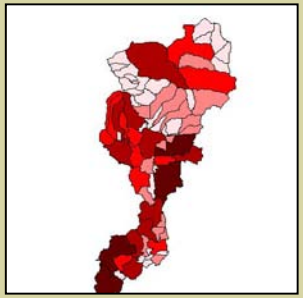
EMC Estimates



Annual Load Estimates



Flow Estimates



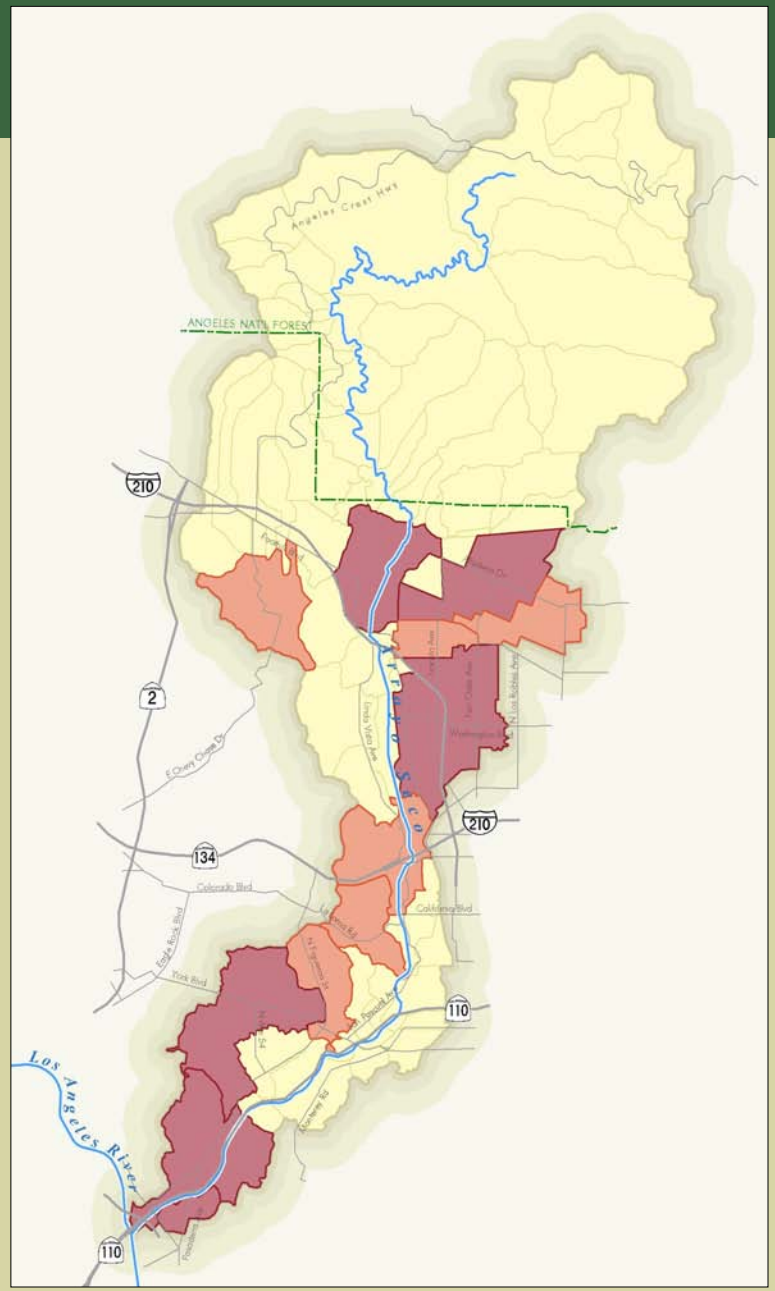
Model Results From All Parameters Consolidated to Identify Key Sub-Watersheds

Across all bacteria and metals, sub-watersheds displaying high concentrations and/or annual loads were identified

High priority – elevated results across all parameters

Medium priority – elevated results for a subset of parameters

Sub-watershed status will be used to prioritize BMP site identification

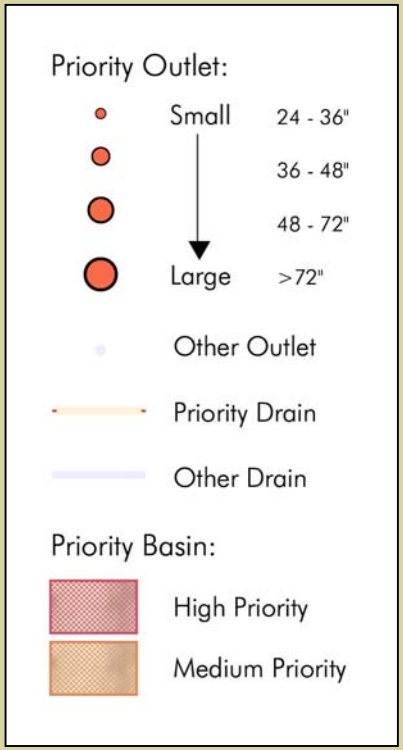


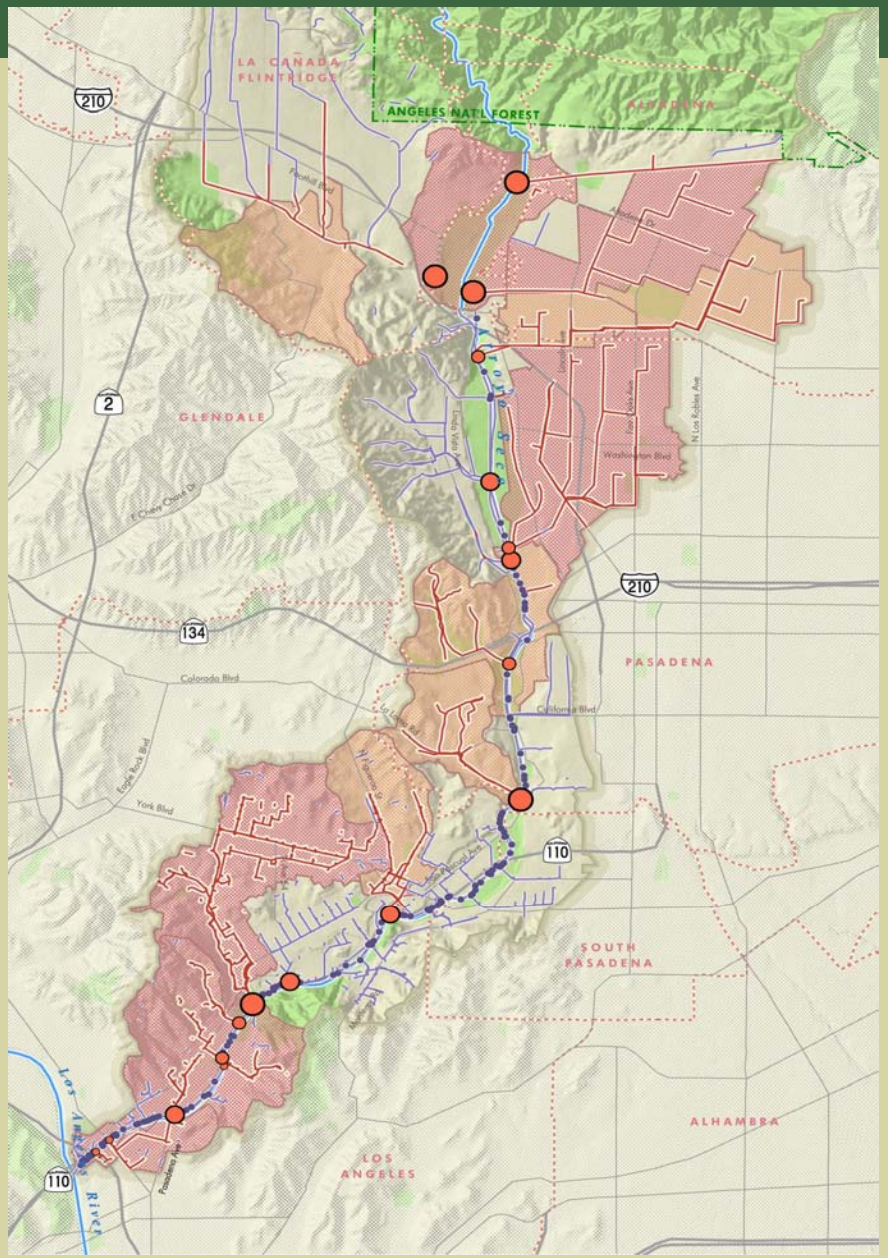
Key Sub-Watersheds Then Used To Identify Important Storm Drain Networks and Channel Outlets

Drains identified from LA County DPW and City of Los Angeles drain maps

Outlets identified via GIS and confirmed with field surveys

Flow directions based on LA City maps and topography





Process For Identifying Specific Sites and BMPs to Reduce Runoff / Nonpoint Pollution

1. **Identify existing opportunities for structural BMPs**
   - **Vacant space**
   - **Multi-benefit project sites**
   - **Large contiguous impermeable surfaces**

2. **Prioritize potential BMP sites based on multiple ranking criteria**

3. **Develop suite of BMP options based on Arroyo Seco WQ profile**

4. **Propose design criteria for site-specific BMPs**

5. **Match BMPs to realities of individual sites based on numerous site characteristics**
   - **Space to treat regional vs. on-site runoff**
   - **Soil type / estimated permeability for infiltration vs. treatment-only solutions**
   - **Multiple other such as existing land use, public / private ownership, public safety, etc.**

6. **Develop final list of prioritized BMP projects**

BMPs Proposed For Consideration in Arroyo Seco Watershed

	Regional Solutions	Onsite Solutions
General Description	Used on sites where this is capacity to treat runoff from a larger upstream sub-watershed Intended to discharge treated effluent directly to Arroyo Seco	To be employed on specific sites expected to contribute pollution • High % impervious • High-impact land use • Large size Could be implemented through retrofit Will be dispersed throughout watershed
Proposed Options	Large-scale infiltration Detention with subsurface flow wetlands Disinfection / treatment	Cisterns Onsite storage and reuse Small-scale infiltration (porous pavement, infiltration wells, bioretention) Small-scale treatment

Multi-factor Ranking Scheme Used to Identify Recommended BMP For Each Site

Example of assessment methodology for <u>regional</u> BMP solution

- **Welch Property and I-5 / 110 Interchange, Lincoln Heights**

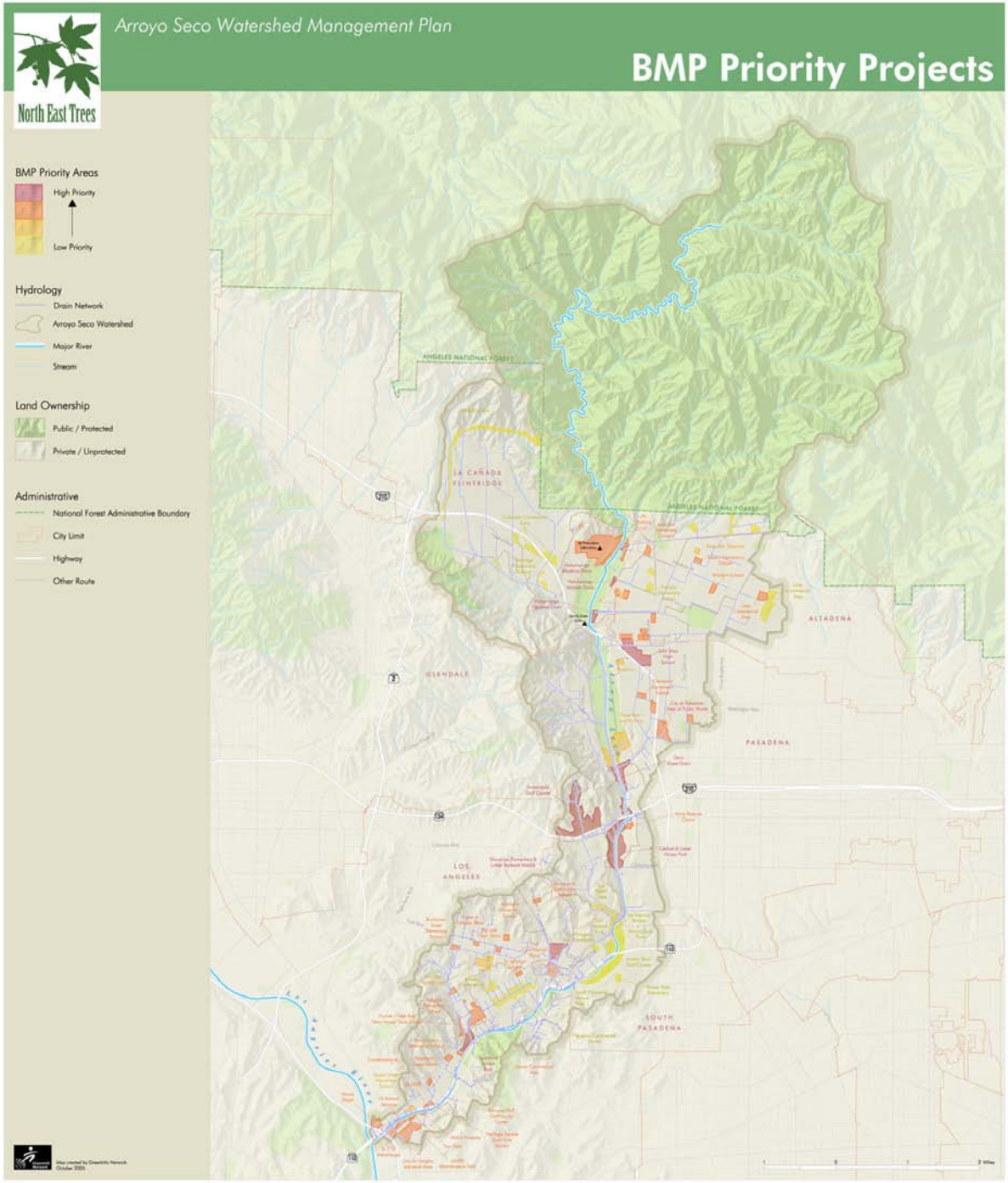
Ranking	Potential Fatal Flaw?	Weight	Score (1=worst - 5=best, FF)		
			Infiltration	Detention w/ SSF wetlands	Disinfection Treatment
Cost		**30.0%**			
– Capital	N	20.0%	5	3	1
– Operations and Maintenance	N	10.0%	4	3	1
Effectiveness		**30.0%**			
– Treatment levels	N	20.0%	4	3	4
– Multiple Pollutants	N	2.5%	5	4	4
– Volume mitigation	N	2.5%	5	3	2
– Reliability	N	5.0%	3	3	3
Implementation		**30.0%**			
– Implementation Issues					
– Engineering/Siting Feasibility	Y	15.0%	5	5	4
– Ownership/Right-of-Way/Jurisdictions	Y	5.0%	2	2	2
– Environmental Clearance	N	5.0%	4	4	2
– Permitting, Water Rights	Y	2.5%	5	5	2
– Safety	Y	2.5%	3	3	3
Environment/Other Factors		**10.0%**			
– Other Beneficial Uses (e.g., conservation)	N	5.0%	5	4	1
– Other potential consequences	Y	5.0%	3	3	3
Weighted Score		**100.0%**	4.25	3.425	2.525

Infiltration selected, as it receives highest score

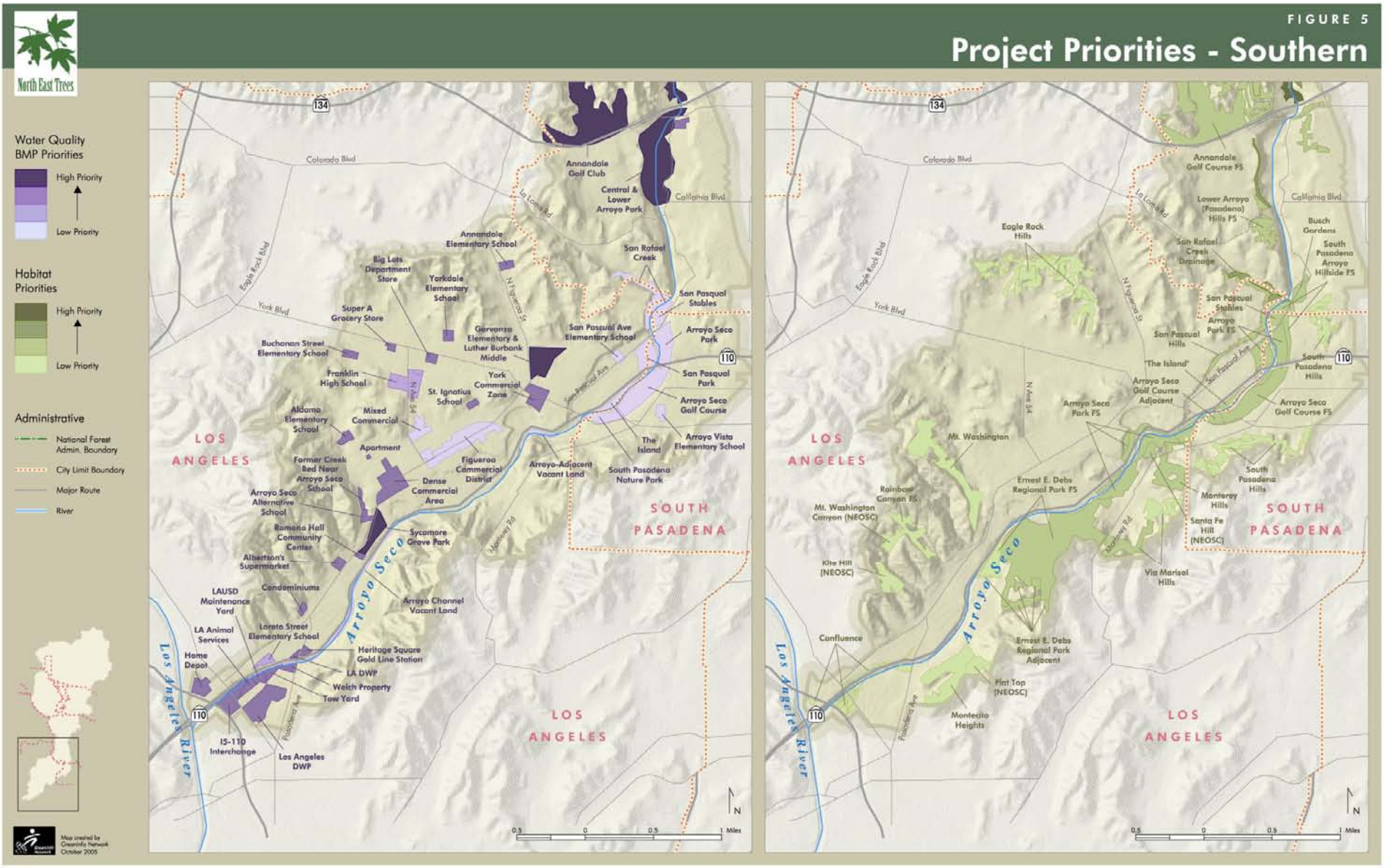
Example Results of BMP Matching for City of Los Angeles Regional Solutions

Project Description	BMP Technology	Score	Rationale
Sycamore Grove Park & North Branch of Arroyo Seco	Infiltration, combined with naturalization of storm drain through park	4.6	Huge upstream area, polluted effluent, open space, and adjacent to channel
Garvanza Elementary / Burbank Middle	Infiltration	4.2	Public property, adjacent to two storm drains draining upstream area
Welch Property	Infiltration *or* detention with subsurface flow wetland	3.8	Terminus of storm drain draining industrial area, significant and unused open space
I5 / 110 Interchange	Infiltration *or* detention with subsurface flow wetland	3.8	Terminus of storm drain draining industrial area, significant and unused open space
Franklin High School	Detention basin with subsurface flow wetland	3.5	Public property, adjacent to storm drain draining upstream area

Map of Arroyo-Wide BMP Sites



Map of LA-Specific BMP and Habitat Projects



Plan Will Also Propose Nonstructural BMPs and Other Measures

Launch "Arroyo Backyard" Program

- **Establish homeowner incentives for installation of rain barrels, cisterns, rain gardens, and permeable driveways / pathways**
- **Launch incentives to garden with native plants**

Increase level of street sweeping and signage in densely developed neighborhoods likely to contribute significant nonpoint source pollution

Explore changes in local government programs to promote runoff reduction and implementation of source control measures

- **Implement runoff fees based on lot size / permeability**
- **Establish stream buffer zones**
- **Establish permeability zones and associated incentive programs**

Work with city agencies to begin rolling watershed-friendly designs into municipal infrastructure design standards

Implement increased water quality sampling program to confirm source areas, estimate load and concentrations, and evaluate efficacy of BMPs when installed

Key Success Factors

From a general perspective:

- **Strong champions needed. Attendance of stakeholder personnel at Technical Advisory Committee meetings not sufficient.**
- **Careful selection and management of subcontractors.**
- **Strong understanding of data needed and data availability at outset of project.**

From a nonprofit organization perspective:

- **Strong project management skills on the part of nonprofits – sometimes a challenge when managing large, complex projects.**
- **Strong existing network of both political and nonprofit contacts.**

Barriers Faced During The Project

Continually shifting regulatory environment

- **Incentive for participation continually changing based on regulatory changes.**

Funding available, but design standards difficult without fixed water quality objectives in place

- **Difficult to rally support for expensive BMPs when critical TMDLs have yet to be developed.**

Difficult to secure stakeholder consensus in an urbanized landscape with large population

- **Difficult to get appropriate decision makers at the table, especially when watershed fragmented among many jurisdictions.**
- **Requires far more one-to-one meetings, which have a major impact on budget and schedule.**

Poor cost and performance data, especially with respect to maintenance.

In urbanized watersheds, water quality not as compelling as issues associated with open space, land use, transportation, and recreation.

Potential Barriers to Implementation

Conflict of new BMP technologies with existing municipal standard designs and infrastructure

- **City engineering departments very reluctant to adopt non-standard technologies in areas with other infrastructure (streets, utilities, etc), yet "standard" approval process can take up to two years**
- **Projects proposed by outside organizations often get lower priority than city-initiated projects**

Implementation hurdles when nonprofit doesn't have "landlord" status

- **Adoption must be through influence, which is difficult when dealing with large city governments (Pasadena population 140K, Los Angeles 3.9M)**

Lack of data

- **Risk-averse bureaucracies often require substantial data prior to implementation, but little funding available either through cities or other agencies to generate required data**
- **Solution: Change of mindset encouraging adaptive management.**